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Original Research Article

Impact of health management information systems on service delivery among healthcare workers at Iten County Referral Hospital

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ABSTRACT

Background: Decision-making process and effective planning within the health sector relies majorly on availability of reliable, accurate and prompt information. Most referral healthcare facilities in Kenya utilize health management information systems (HMIS) yet delivery of effective services remains relatively challenging. Against this backdrop, we assessed the impact of use of HMIS on service delivery among healthcare workers at Iten County Referral Hospital (ICRH).
Methods: This study used a cross-sectional study design target population was all healthcare workers at ICRH. Closed and open-ended questionnaires were used to obtain data. Purposive and stratified sampling techniques were used to select study site and participants respectively. The sample size was 185 healthcare workers but 142 participants filled out the questionnaire.
Results: Most respondents were nurses (37.4%). Least cohort were pharmacists (1.40%). About 62.7% were diploma-holders, 26.8% had a bachelor's degree. Further, 66.9% of participants had <10 years working experience, 22.5% had 11-20 years while; 10.6% had 21-30 years. Participants (26.1-47.2%) agreed that using HMIS is efficient and effective for managing hospital data. Majority were undecided whether HMIS can be used for managing financial imperatives and providing epidemiological data. Participants (77.5%) rated HMIS as being user-friendly. Remarkably, 22.5% rated the HMIS as suitable for use as a centralized planning system for the hospital. Data also showed that HMIS is yet to be fully integrated into the hospital system.
Conclusions: The use of HMIS has positively impacted service-delivery at ICRH. We therefore recommend that healthcare facilities integrate the use of HMIS in management of hospital data.

Keywords: Health information management system, Health information technology, Information systems

INTRODUCTION

Healthcare facilities deal with a lot of record keeping as part of the standard operating system. Initially, physical handling of such records was done by health record officers. In addition, circulating authorized patient information across system had to be done by physical means. In recent years, advancement in technology has made it possible for handling of records in the hospital to be made paperless.[1] Furthermore, the drive to paperless mode is also driven by the rising concerns for climate change associated with carbon footprint of every person. Most hospitals in developed countries have fully transitioned to paperless management of hospital information.[2] However, in developing countries, much is yet to be done to develop information technologies needed let alone fully integrating them into health management systems. Technologies on information systems when satisfactorily integrated into healthcare improves waiting time for results from various departments, fastens inter-department communication and patient processing and

offers a centralized means of imputing, analyzing, storing and reporting of patient data.[3] Effective diagnosis of a condition relies on reliable and timely delivery of data which in Kenya is still a bottleneck challenge. Kenya health sector vision 2030 points out that one of the challenges to effective delivery of healthcare services is a weak health information system.[4]

Public hospitals in Kenya utilize several health information systems with the main one being Kenya health management information system (HMIS).[5] Various weaknesses have been identified in the system including having several data collection subsystems, unskilled personnel, incomplete integration and poor coordination.[6,7] Moreover, majority of the hospitals especially private hospitals utilize independent information systems. In perspective, this means a patient transferring from private to public and vice versa has to revert to the paper-based record keeping since the hospitals don't have a centralized system for accessing patient data. Generally, the current system is limited in its capabilities to serve healthcare personnel and help efficient delivery of healthcare services but still offers improved services rather than the paper-based system. This study aimed to establish the impact of the use of HMIS on service delivery among healthcare workers by assessing the extent of utilization of HMIS, the correlation of quality-of-service delivery with use of HMIS and the challenges associated with using HMIS.

METHODS

This study employed a cross-sectional survey research design and was conducted at Iten County Referral Hospital (ICRH).[8] All healthcare workers comprising: medical doctors, pharmacists, dentists, nurses, and health-records officers formed the target population. The study was conducted between April 2021 and May 2021. Inclusion criteria entailed: participant must be a staff within ICRH; working within critical departments that operate on a day-to-day basis and also had to be using the HMIS system on a routine basis. Healthcare providers not working at ICRH were not included in the study. The health-record officers were included since their work revolves around management of hospital data. Stratified and purposive sampling techniques were used to select study site and participants respectively. Healthcare workers were stratified based on the department they work under. This gave every worker an equal chance to participate. In total, 185 healthcare workers were sampled for this study. Both open-ended and closed-ended questionnaires were used to collect data. Validity and reliability of the research tools was established by pre-testing that was done during the pilot study.[9] Data was first scrutinized for completeness and consistence then coded. The statistical package for social sciences (SPSS version 25.0) and Microsoft excel was used to analyze the data and generate descriptive statistics such as frequency counts, and percentages. The classified data was presented into tables and graphs.

The initial study approval was obtained from the School of Pharmacy, Kabarak University. Ethics review clearance was sought from Kabarak University institutional scientific and ethics review committee (KABU–ISERC) with the approval number; KUREC-021021. permit to collect data was obtained from the National Commission of Science, Technology and Innovation (NACOSTI) (research license number NACOSTI/P/21/14572). informed consent was sought from each participant before data collection commenced. Participation in the study was voluntary and the subjects were allowed to withdraw from the study at any point during data collection. Collected data is stored in a computerized password-protected device. All data will be discarded through deletion three years after completion of study.

RESULTS

Response rate

Table 1 indicates that a total of 185 questionnaires were distributed to the respondents. Out of the 185 questionnaires that were issued out, 142 were fully filled and returned which translated to 76.8% response rate. According to Zikmund et al, a 50% response rate is adequate, 60% is good and 70% and above is very good.[10] The response rate of 76.8% for this study was therefore considered satisfactory to make conclusions. Therefore, the response rate obtained in this study was excellent for analysis and reporting.

Table 1: Response rate.

Category	Frequency	Percentage (%)
Returned	142	76.8
Not returned	43	23.2
Total	185	100

Demographic data

Professional expertise

Figure 1 shows that 40.1% of the respondents were others (dental technologists II, accountants and assistant accountants, health records officers, community oral health officers, technicians, physiotherapists, supply chain officers and radiographers). Further, 37.4% were nurses, 4.9% of the respondents were medical doctors, 12% were clinical officers, 4.2% were pharmaceutical technologists and 1.4% were pharmacists. It is thus clear from the above that most participants were nurses. The results further depicted fair response based on targeting procedures adopted by this study in that the hospital population is made up of more nurses compared to other employees.

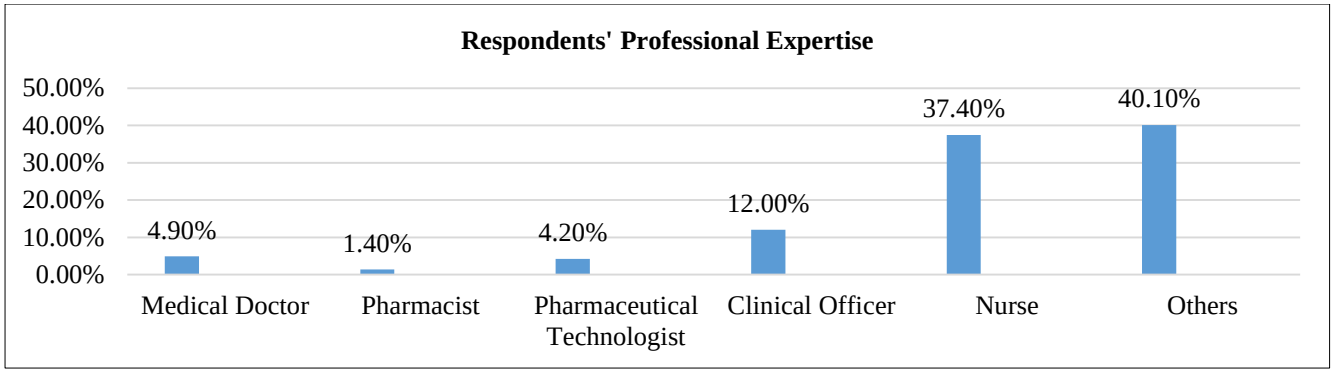

Figure 1: Respondent's professional expertise.

Educational qualification of the respondents

Figure 2 shows that 62.7% of respondents were holders of diploma certificates, 26.8% had bachelor's degree in various fields and 5.6% had other qualifications such as accountants and higher diplomas or postgraduate diplomas. The findings indicated diploma holders formed more than half of the respondents.

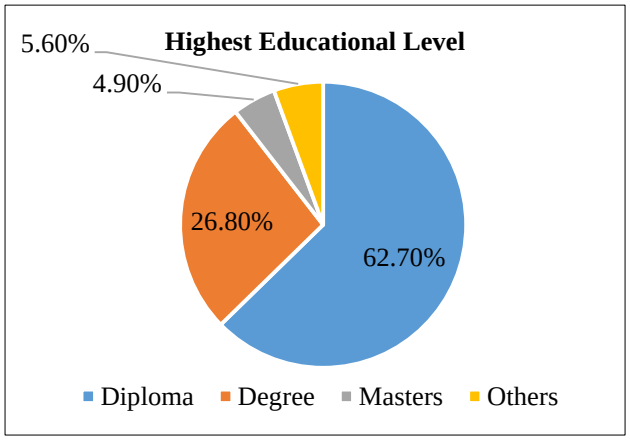

Figure 2: Educational qualification of the respondents.

Respondents working experience

Figure 3 shows that out of the 142 respondents, 66.9% had less than ten years of experience, 22.5% had eleven to twenty years of experience and 10.6% had twenty-one to 30 years of experience. Therefore, it can be deduced that a majority of the respondents are comprised of a young workforce.

Use of hospital information management system

Table 2 indicates that 43.7% agreed with the statement that system has become easier to use and 21.1% strongly agreed with the statement. Almost half of the respondents (47.2%) agreed with the statement that system provides more functionality for accessing services and 28.9% strongly agree with the statement. It was evident from the study that 45.2% of the respondents were in agreement with the statement that the system enables excellent use and access if in/out patient information and 35.9% strongly agreed with the same. Regarding system has improved quality of service, 36.6% of the respondents did agree with the statement and 35.9% strongly agreed. Nearly half of the respondents (43%) agreed with the statement that the system provides disease notification data, 26.1% were undecided and 23.1% strongly agreed with the statement. Further, 40.8% of the respondents agreed with the statement that system provide epidemiological data, 25.4% were not sure and 19% of the respondents strongly agreed. On the other hand, 37.3% of the respondents were not sure with the statement that manages financial imperatives, 36.1% did agree with the statement and 29.6% strongly agreed with the same. Finally, the study showed that 40.1% of the respondent strongly agreed with the statement that system has improved on patient information security and 35.3% were in agreement with the statement.

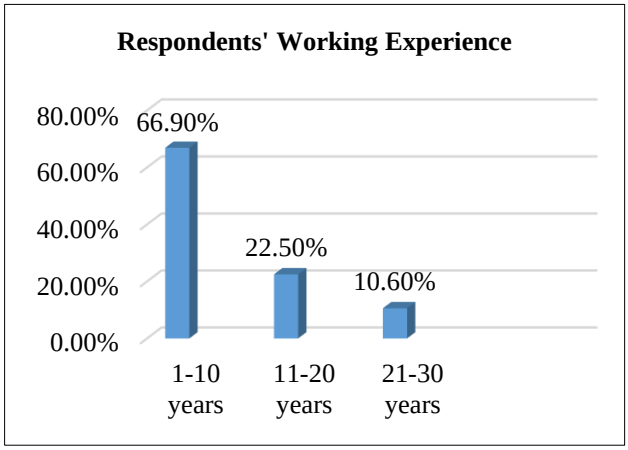

Figure 3: Respondents working experience.

Strengths of hospital information management system

Table 3 shows that 43% of the respondents indicated that the system is easier and quick access to patient information, 34.5% were of the opinion that the system is user friendly than paper-based system and 22.5% felt that there is availability of a centralized planning system. The results showed that the system is strong as opposed to manual one.

HMIS provision of accurate and relevant patient information

Table 4 reveals that respondents in the hospital agreed strongly (61.2%) the system in use provides accurate and relevant patient information and 14.8% were of the same opinion. The study has established the system in use in the public hospital is not fully integrated some sections are yet to be automated and this could be hampering the provision of accurate and relevant patient information.

Challenges in the use of hospital information management system

Table 5 shows that the main challenges encountered in ICRH were, few ICT staff to assist when needed, few computers for use, inadequate software coverage, systems are slow and lack of training of users, system not yet implemented in some areas. Other challenges were system providing inaccurate information, respondents not knowledgeable with the system, system not user friendly, and employees having negative attitude towards the system.

Recommendations on the improvement of the existing hospital information system

Table 6 shows 30.3% of respondents indicated that they want complete overhauls of the system, 48.6% stated that they would want development of electronic resource planning system for the hospital and 21.1% cited development of specific tools to the current structure. It can be deduced from the study that more training on the use of the system was recommended by the respondents.

Table 2: Use of hospital information management system.

Statement	SD (%)	D (%)	N (%)	A (%)	SA (%)
System has become easier to use	3 (2.1)	17 (12.0)	30 (21.1)	62 (43.7)	30 (21.1)
System provides more functionality for accessing services	10 (7.0)	7 (4.9)	17 (12.0)	67 (47.2)	41 (28.9)
System enables excellent use and access of in/out patient information	11 (7.7)	2 (1.4)	14 (9.9)	64 (45.1)	51 (35.9)
System has improved quality of service	5 (3.5)	3 (2.1)	31 (21.9)	52 (36.6)	51 (35.9)
Provides disease notification data	7 (4.9)	4 (2.8)	37 (26.1)	61 (43.0)	33 (23.2)
System provides epidemiological data	16 (11.3	5 (3.5)	36 (25.34)	58 (40.8)	27 (19.0)
Manages financial imperatives	4 (2.8)	6 (4.2)	53 (37.3)	37 (26.1)	42 (29.6)
System has improved on patient information security	10 (7.0)	11 (7.7)	14 (9.9)	50 (35.3)	57 (40.1)

Table 3: Statements on strengths of hospital information management system.

Strengths	Frequency	Percent
User friendly than paper-based system	49	34.5
Availability of a centralized planning system	32	22.5
Easier and quick access to patient information	61	43.0
Total	142	100.0

Table 4: HMIS provision of accurate and relevant patient information.

Response	Frequency	Percent
Strongly disagree	0	
Disagree	17	12
Neutral	17	12
Agree	21	14.8
Strongly agree	87	61.2
Total	142	100

Table 5: Challenges in the use of hospital information management system.

Statements	SD (%)	D (%)	N (%)	A (%)	SA (%)
Incorrect information	27 (19.0)	17 (12.0)	40 (28.2)	32 (22.5)	26 (18.3)
Computers not enough for users	4 (2.8)	7 (4.9)	19 (13.4)	58 (40.8)	54 (38.1)
Not fully knowledgeable with the system	13 (9.1)	17 (12.0)	39 (27.5)	48 (33.8)	25 (17.6)
System keeps going on and off	9 (6.3)	13 (9.2)	14 (9.9)	39 (27.4)	67 (47.2)

Continued.

Statements	SD (%)	D (%)	N (%)	A (%)	SA (%)
Lack of comprehensive coverage of the system	2 (1.4)	23 (16.2)	18 (12.7)	43 (30.3)	56 (39.4)
System is slow	5 (3.5)	21 (14.8)	23 (16.2)	36 (25.4)	57 (40.1)
Users' needs not fully captured by the system	11 (7.7)	22 (15.5)	39 (27.5)	30 (21.1)	40 (28.2)
Not user friendly	25 (17.6)	44 (31.0)	38 (26.8)	18 (12.6)	17 (12.0)
Employees have negative attitudes towards changes	35 (24.6)	24 (16.9)	27 (19.1)	34 (23.9)	22 (15.5)
Lack of system testing	14 (9.9)	24 (16.9)	43 (30.3)	33 (23.2)	28 (19.7)
Lack of training of users	16 (11.3	21 (14.8)	18 (12.6)	46 (32.4)	41 (28.9)
Poor changeover between the new and old software	14 (9.9)	20 (14.0)	36 (25.4)	41 (28.9)	31 (21.8)
Inadequate software coverage for the whole hospital	10 (7.0)	8 (5.6)	23 (16.2)	59 (41.6)	42 (29.6)
Few ICT staff to assist when in need	5 (3.5)	22 (15.5)	22 (15.5)	43 (30.3)	50 (35.2)
Incompatibility between the new and old system	12 (8.5)	19 (13.4)	56 (39.4)	24 (16.9)	31 (21.8)

DISCUSSION

A total of 142 dully filled questionnaires were returned out of the 185 distributed. This represents a 77% response rate which according to Zikmund et al is very good for making satisfactory conclusions.[10] Majority of the respondents were nurses while those that made up the larger percentage of participants were those not in the aforementioned professional domains. Nurses form the greatest cohort of healthcare workers as shown by the WHO.[11]

Pharmacists formed the smallest proportion while medical and clinical officers were in the intermediate level. This corresponds to the work distribution of healthcare officers common in most public hospitals in Kenya. Evidently, it is expected that the number of nurses to be higher due to their duties and responsibilities within the hospital followed by the medical and clinical officers. Moreover, they are responsible for keeping a detailed account of what medical procedures and medications the patient is taking. In terms of the highest education level reached, the majority (62.7%) had attained diploma level certification. They were followed by those who attained bachelor's degree at 26.8%. least proportion at 4.9% were healthcare providers who had undergone a postgraduate program.

In Kenya, nurses are trained either at university or college level specifically Kenya medical training college. While the former attains a degree level, the latter are awarded a diploma certificate. Thus, the high number of diploma graduates could be attributed to nurses forming the larger percentage of hospital taskforce. Those at master's level are few because they are mainly specialist healthcare providers and less than 3 are found per hospital department.

The major proportion of respondents (67%) had a working experience of between 1 to 10 years while the remaining proportion had more than 10 years of experience. This paints a mix picture of how the healthcare workers is used to working with HMIS. While over 30% have more than 10 years' experience corresponding to an increasing level of efficiency in terms of using HMIS, more than half the respondent has less than 10 years which might suggest some don't have enough experience in working with HMIS.

Evidently, the findings show that majority comprises a young taskforce that can easily trained and made to understand how to use HMIS. When questioned about the use of HMIS, more than half the respondents either strongly agreed or agreed that the system has become easier to use, that it provides more functionality for accessing services, facilitates excellent use and access of patient information, provides notification and epidemiological data, has improved quality services and security of patient information records. Moreover, 61.2% of respondents strongly agree that HMIS provides accurate and relevant patient information which is required for patient diagnosis and record keeping. Ultimately the analysis shows that use of HMIS positively impacts healthcare service delivery by the healthcare taskforce which is echoed by the study done by Mwaniki.[12]

The study also noted several strengths and challenges of using HMIS. Forty-three percent agree that the system is easy and quick for accessing patient information, 34.5% agree it is user friendly than the paper-based system while 22.5% indicated it provides a centralized planning system. These strengths are a representation of the system providing efficient service delivery. However, the proportion that agree with each strength is relatively low corresponding to inefficiencies which might negatively impact service delivery.

In addition, the participants noted four challenges associated with using HMIS: insufficient technical support staff with expertise on maintaining the system, few devices which lacks enough software coverage and are not up to date and that not all departments are integrated with the system. Similar results were seen in the study done by Kimama who stated hospitals lack adequate technical

support to manage the system and also most healthcare workers are not properly and effectively trained in using the system.[13] While these systems seem to significantly influence impact of HMIS, the positive outcome from the respondents outweighs such challenges. In order to fully integrate and realize full impact of HMIS, these challenges need to be addressed and resolved for a smooth running and efficient delivery of healthcare services through HMIS.

During this study several limitations were met including: sample as opposed to the entire staff were allowed to participate yet findings were depiction of the entire staff fraternity. Data access was challenging coupled with the time constraints that were set to finish the research.

CONCLUSION

Well-integrated hospital information management system is able to manage effectively all the information and data needs of any hospital and in return provide quality service to the patients. Financial imperatives are well managed with this kind of system and can greatly curb financial malpractices. Hospital information management system is able to provide timely, accurate and relevant data whether on the patient, disease notification or epidemiological data very easily. Security on patient information can well be managed effectively with the help of the hospital information management system. Training of healthcare workers is required from the time of implementation to enable the effective utilization of the system, without which the system will not achieve the intended purpose. In conclusion, health management information system has positively impacted service delivery by healthcare workers if effectively implemented. However, to fully realize the impact of HMIS on healthcare services, the challenges facing the use of the system have to be addressed and resolved.

Recommendations

Hospitals are currently looking to fully computerized their operations including data and record keeping. In examining the impact of HMIS on service deliver among healthcare workers, this study established some of the technicalities arising from using HMIS that might lower quality and rate of healthcare service delivery. Main challenges were technical in nature with additional provision of fewer technical assistants. Given this finding, we proposed that hospitals should: increase the number of computers in each department to make system software accessible and reduce waiting time; regularly update and maintain the system to prevent it from crashing during use; formulate and implement workshops that regularly educate and train hospital staff on how to use HMIS; increase the number of ICT experts to assist running they system or troubleshooting it when it crashes; and regularly review information within HMIS databases to check for accuracy and instances of data breach.

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REFERENCES

1. Stausberg J, Koch D, Ingenerf J, Betzler M. Comparing paper-based with electronic patient records: Lessons learned during a study on diagnosis and procedure codes. J Am Med Informatics Assoc. 2003;10(5):470-7.
2. Benedictis A, Lettieri E, Gastaldi L, Masella C, Urgu A, Tartaglini D. Electronic medical records implementation in hospital: An empirical investigation of individual and organizational determinants. Plos One. 2020;15(6):e0234108.
3. Menachemi N, Collum TH. Benefits and drawbacks of electronic health record systems. Risk Manag Healthc Policy. 2011;4:47-55.
4. Ministry of Health. Kenya Health Policy 2014–2030. 2014. Available at: https://publications.universal health2030.org/uploads/kenya_health_policy_2014_ to_2030.pdf. Accessed on 12 April 2022.
5. Muinga N, Magare S, Monda J, English M, Fraser H, Powell J, Paton C. Digital health Systems in Kenyan Public Hospitals: a mixed-methods survey. BMC Med Inform Decis Mak. 2020;20(1):2.
6. Oleribe OO, Momoh J, Uzochukwu BS, Mbofana F, Adebiyi A, Barbera T, Williams R, Taylor-Robinson SD. Identifying Key Challenges Facing Healthcare Systems In Africa And Potential Solutions. Int J Gen Med. 2019;12:395-403.
7. Ogwel B, Odhiambo-Otieno G, Otieno G, Abila J, Omore R. Leveraging cloud computing for improved health service delivery: Findings from public health facilities in Kisumu County, western Kenya-2019. Learning Health Systems. 2021;6(1).
8. Setia M. Methodology series module 3: Cross-sectional studies. Indian J Dermatol. 2016;61(3):261.
9. Kimberlin CL, Winterstein AG. Validity and reliability of measurement instruments used in research. Am J Health-System Pharm. 2008;65(23):2276-84.
10. Zikmund W, Carr B, Griffin M, Babin B, Carr J. Business Research Method. Australia: South-Western. 2013.
11. Woods AD. WHO: State of the world's nursing 2020. Lippincott Nursing Center | Professional Development for Nurses. Available at: https://www. nursingcenter.com/ncblog/april-2020/who-state-of-the-worlds-nursing-2020. Accessed on 12 April 2022.
12. Mwaniki JR. Influence of Health Information Sytem on Service Delivery in Public Health Facilities in Kenya: A Case of Imenti North Sub-County, Meru County, 2017. Available at: http://erepository. uonbi.ac.ke. Accessed on 12 April 2022.
13. Kimama FM. Challenges facing the implementation of hospital management information systems in

hospitals in Nairobi, 2021. Available at: http://erepository.uonbi.ac.ke/bitstream/handle/11295. Accessed on 12 April 2022.

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